Assessing Research Capacity In Agricultural Education: A Summary Of Twelve Land Grant Program Administrators

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Abstract

The accomplishments of land grant colleges are well documented and have benefited the public for many years. Recommendations concerning the future direction of land grant research suggest an increased emphasis on interdisciplinary and collaborative research efforts. Before agricultural educators promote their involvement in interdisciplinary initiatives, they must first assess the unique skills they might offer. To determine the potential contributions that agricultural education offers the land grant research system, baseline data was collected. The primary purpose of the study was to assess the research capacity of agricultural education from the perspective of individual institutions and of the profession.

Data were collected from agricultural education faculty, primarily departmental administrators, representing 12 land grant institutions. Respondents were asked to provide institutional information regarding faculty, graduate students, research support staff, and research infrastructure. Another part of the data collection instrument required respondents to indicate the level of expertise within the agricultural education profession involving disciplinary skills.

The findings indicated a wide disparity among institutions in the number of agricultural education faculty employed, the number of graduate students, and the number of assistantships available. It was also concluded that agricultural education programs have access to a wide range of research support staff and infrastructure resources. In general, these institutional resources appeared to be adequate in meeting the needs of researchers. Further, the respondents characterized the agricultural education profession as possessing expertise with a number of disciplinary skills.

More faculty appointments were recommended to conduct research and mentor graduate students in the scholarly process. Tenured faculty were encouraged to continue to conduct and publish research studies. It was suggested that graduate programs be designed to include collaborative research projects and activities in order to prepare doctoral students for their future involvement as faculty members.

Further recommendations were to communicate to Experiment Station Directors and Land Grant College Administrators the research skills and potential contributions that agricultural education offers for building collaborative efforts. Therefore, faculty should prepare graduate students so that they develop research expertise in the disciplinary skills the profession has identified as its strengths. However, further study was needed to assess the research capacity of the entire profession.

Introduction / Theoretical Framework

Land grant colleges were created in 1862 when President Abraham Lincoln signed the Morrill Act. As a result of this legislation, financial support in the form of federal land helped create colleges of agriculture in each state. The Morrill Act mandated " . . . learning as related to agriculture and the mechanic arts . . . " and was designed " . . . to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life" (Morrill Act, 1862, p. 503). The creation of land grant colleges was in contrast to the emphasis in higher education on the classics, philosophy, and theology (Meyer, 1993). The concept of practical education for citizens of ordinary means was initiated through the Morrill Act.

In passing the Hatch Act in 1887, Congress recognized the need for research as a basis for developing agriculture. Federal funding was authorized for the creation of an agricultural experiment station in connection with each land grant institution. The Hatch Act charged that experiment stations would be responsible for " . . . acquiring and diffusing among the people of the United States useful and practical information on subjects connected with agriculture, and to promote scientific investigation and experiment respecting the principles and applications of agricultural science . . . " (Hatch Act, 1887, p. 440). The Hatch Act allowed the United States Department of Agriculture to assist agricultural education during its early development. Teachers received instructional publications, bulletins, and experiment station results in an effort to integrate science into the agricultural education curriculum (Ekstrom, 1969). Hillison (1996) reported that the Hatch Act provided the " . . . impetus for the first agriscience programs in the United States" (p. 9).

In 1914, Congress passed the Smith-Lever Act, providing for cooperative extension to take information directly to farmers. By advising them on how to translate and use experiment station research information, a grass-roots link was established with farmers and local communities. The Smith-Lever Act provided a coordinated partnership (i.e., cooperative extension) among county, state, and federal governments, which was instrumental in establishing a statewide system of extension programs (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996).

The land grant mission of teaching, research and extension is thus a result of the 1862 Morrill Act, the 1887 Hatch Act, and the 1914 Smith-Lever Act. After the passage of the Morrill Act, many agricultural leaders were of the opinion that the establishment of land grant colleges would solve the problem of educating farm people in agriculture. Any student who wanted to learn agriculture would simply attend the land grant college (Moore, 1987). In the early 1900s, people began to realize that it was impossible to deliver agricultural instruction from the campus of only one institution in the state. The Smith-Hughes Act of 1917 was intended to overcome this problem. As a result, the act specifically established agriculture in secondary schools, and provided funds for teacher salaries and teacher training (Phipps & Osborne, 1988).

The history of research in agricultural education is of a more recent era. It was not until 1960 that the Journal of the American Association of Teacher Educators in Agriculture, now known as Journal of Agricultural Education, was first published. The first National Agricultural Education Research Conference was held in 1974. And in 1985, the North Central Regional Association of State Agricultural Experiment Station Directors approved an agricultural education research advisory committee (NCA-24 Committee, 1987). The purpose of the NCA-

24 Committee was to advise Directors on regional research issues related to agricultural education.

The public has benefited from the historical accomplishments of land grant colleges for many years. However, concerns have been raised about the tripartite structure, and the ability to adapt to the U.S. public's changing needs and priorities (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996; Meyer, 1997). "It's not business as usual" (Board on Agriculture, 1996, p. 1) was the most common phrase made by customers of land grant colleges when defining future direction and strategy. The motivation for this study is based on the need to be aware of the land grant research challenges for the 21st century, and decide how agricultural education can become a contributing partner in future research efforts.

Recommendations concerning the future direction of land grant research suggested an increased emphasis on inter- and multidisciplinary research, and noted the need for collaboration across disciplines, institutions, and states (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996). Team research that produces useful answers, and other interdisciplinary approaches have been recommended as priorities for the land grant system (Board on Agriculture, 1996). Indeed, the agricultural education profession has received similar advice. Jordan (1993) argued that research in agricultural education should extend beyond its disciplinary confines to address larger and more significant research problems.

Members of the profession have recommended a widening of collaborative research partnerships among institutions and states (NCA-24 Subcommittee on Agricultural Education Research, 1997). Williams (1991) suggested that partnerships with agencies, industry, and teams of researchers would promote interdisciplinary research. He contended that multiple researchers who provide unique expertise and resources could better conduct research projects.

How does the profession fare in its research efforts within the land grant system? According to a national study of Agricultural Education Departments in the United States (Persons & Kajer, 1995), 16 of the 80 responding institutions reported research projects within their departments being conducted with experiment station funds. Institutions reported a total of 36 research projects being conducted, with most of the projects related to teacher preparation themes.

Prior to communicating the research skills and potential contributions that agricultural education offers for building collaborative efforts, it was necessary to first assess its research capacity. MacKenzie (1997), finding no conceptual framework for measuring institutional research capacity, utilized concepts from the private sector. He suggested that a strategic architecture could be developed within an institution and within a region by identifying core competencies through an assessment of institutional capacity. As a result, planning strategies become more obvious, collaborations and partnerships become strategic, and opportunities for resource efficiencies enhanced.

It was appropriate and timely to evaluate the research capacity of agricultural education in order to position the discipline for future involvement in land grant research. This study was conducted to collect baseline data to assist with this process.

Purpose / Objectives

Research is the basis for many of the principles of agricultural education. As the profession seeks to conduct collaborative research within land grant colleges, it must first assess its capacity to become a contributing partner in the process. The purpose of this descriptive study was to assess the research capacity of agricultural education from the perspective of individual institutions and of the profession. The specific research objectives were to:

1. Determine the human resources available to contribute to research programs involving agricultural education.
2. Determine availability and adequacy of research support and infrastructure.
3. Identify disciplinary strengths in agricultural education.

Methods / Procedures

Members of the NCA-24 Committee on Research in Agricultural Education played a key role in the data collection process. Agricultural Education faculty, primarily program administrators, from each of the land grant institutions in the North Central Region comprised the committee. The twelve states in the North Central Region included: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. In addition, three states from outside the region (i.e. Arkansas, Oklahoma, and Texas), were full members of the NCA-24 Committee and also provided data.

The data collection instrument was created by a NCA-24 subcommittee in response to a charge to assess the research capacity of agricultural education. During a period of several months, multiple drafts of the instrument were developed and modified as a result of email, face-to-face, and telephone communications. The NCA-24 committee reviewed the instrument and served as the expert panel to examine the validity of the instrument.

Members attending the NCA-24 Committee on Agricultural Education Research in February 2000 were asked to participate in the data collection process. Each representative completed the instrument based on their view of agricultural education research capacity at their respective institution and of the profession.

The data collection instrument was comprised of two parts. The first part asked respondents to provide information regarding research capacity in agricultural education at their institution. One section requested the number of faculty Full Time Equivalents (FTEs) by rank and tenure status. Another section asked for the number of full time graduate students and their level of assistantship (i.e., none, ¼ time or ½ time). In the last section, respondents were asked to identify the availability and adequacy of 17 institutional research support items. These items were organized under two categories: support staff and infrastructure. Respondents were to answer ‘yes’ or ‘no’ regarding the availability and adequacy of each item at their respective institution.

The second part of the data collection instrument asked respondents to indicate the level of expertise within the agricultural education profession involving various disciplinary skills. Twenty-seven disciplinary skills were organized into four categories labeled: Needs Assessment, Curriculum Development & Instructional Design, Information Transfer & Delivery, and

Evaluation & Assessment. Respondents rated each research skill using the following scale values: 1 = none, 2 = little, 3 = some, 4 = much, and 5 = expert.

Data were entered into a personal computer and analyzed using SPSS 10.0. Descriptive statistics were used to summarize and analyze the data since the purpose of the study was to describe the characteristics of the respondent's institution and the profession.

Results / Findings

Data collection instruments were received from 12 agricultural educators representing 12 states. Respondents reported a total of 96.7 FTE agricultural education faculty employed at the 12 land grant institutions. This total consisted of faculty FTEs in the following ranks: 11.5 Instructors (11.9%), 28.5 Assistant Professors (29.5%), 24.7 Associate Professors (25.5%), 27.1 Professors (28.0%), and 5.0 Others (5.2%). The average number of faculty by rank in each institution were as follows: 1.0 Instructors, 2.4 Assistant Professors, 2.1 Associate Professors, 2.3 Professors, and .4 Others. An average of 8.2 faculty were reported at each institution, however the range was from 1 to 31. Six of the 12 institutions surveyed had three or fewer faculty FTEs in their agricultural education program.

Agricultural education respondents indicated that slightly over half (52.9%) of the faculty were tenured. The remaining faculty were almost evenly split between those who were not on a tenure track (24.6%), and those who were on a tenure track but had not yet been awarded tenure (22.5%).

Respondents indicated there were 279 full-time graduate students at the 12 institutions. This may provide an indication of the human resources available to assist with research. However, a wide disparity in the number of full-time graduate students at each institution existed. Two institutions reported no graduate students were enrolled, while one institution reported 71 full-time graduate students.

As indicated in Table 1, 43.0% of full-time graduate students were pursuing a Master's Degree and had no assistantship available (n=120). Only 11.9% of the full-time graduate students were receiving an assistantship while completing their Doctoral Degree (n=33). There was a wide range in the number of doctoral assistantships available at each institution. Three institutions reported no doctoral assistantships available, two institutions reported only one assistantship, and two other institutions reported 8 and 10 doctoral assistantships, respectively.

Table 1
Number and Percent of Full-Time Graduate Students in Agricultural Education by Level of Assistantship (n = 279)

Degree Program	Assistantship Level	n	%
Masters	None	120	43.0
Masters	1/4 time	21	7.5
Masters	½ time	40	14.3
Doctoral	None	65	23.3
Doctoral	1/4 time	6	2.2
Doctoral	½ time	27	9.7

All respondents (100%) indicated that research support staff were available in the following categories: secretarial/clerical, project management (budgeting, accounting, reporting, etc.), computer assistance, and research data analysis (Figure 1). The lowest rated item was manuscript preparation assistance, as only 55% of institutions reported that support staff were available to assist with preparing manuscripts for publications or grant proposals.

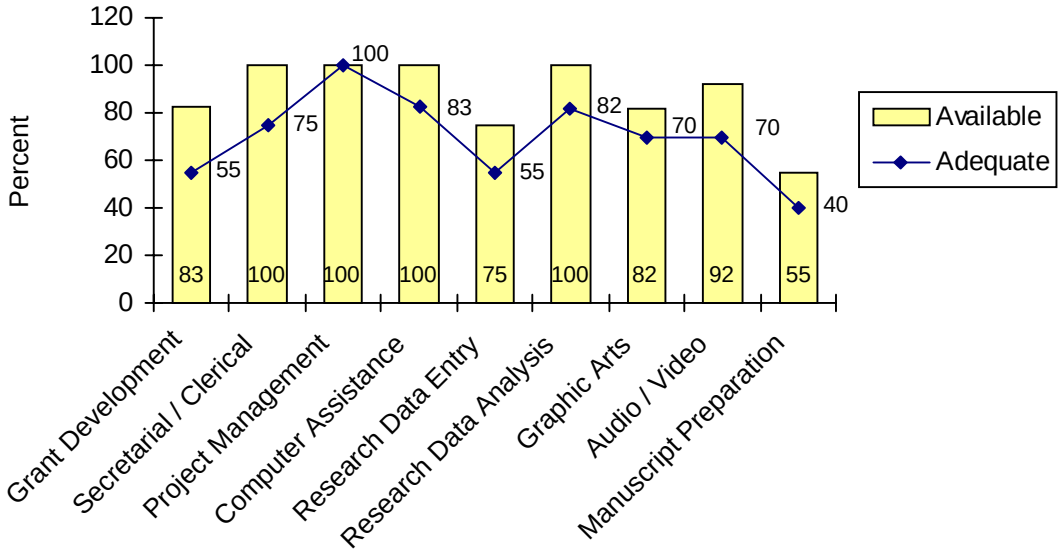

Figure 1. Availability and adequacy of research support staff.

As shown in Figure 1, project management (budgeting, accounting, reporting, etc.) was the only support staff category that all institutions rated as adequate. The next highest rated categories were computer assistance (83%) and research data analysis (82%). Institutions rated

manuscript preparation the lowest support staff category, where only 40% of the respondents reported it as adequate. Other support staff categories considered inadequate were grant proposal development (55%) and research data entry (55%).

All institutional respondents (100%) reported that research infrastructure was available for all items except for publication support (funding for journal page charges), which was available at 90% of the institutions (Figure 2). In rating the adequacy of research infrastructure, only two items received a 100% rating: Internet access, and printing / duplication facilities. The lowest rated infrastructure item was distance learning facilities, as 67% of respondents indicated it was adequate (Figure 2).

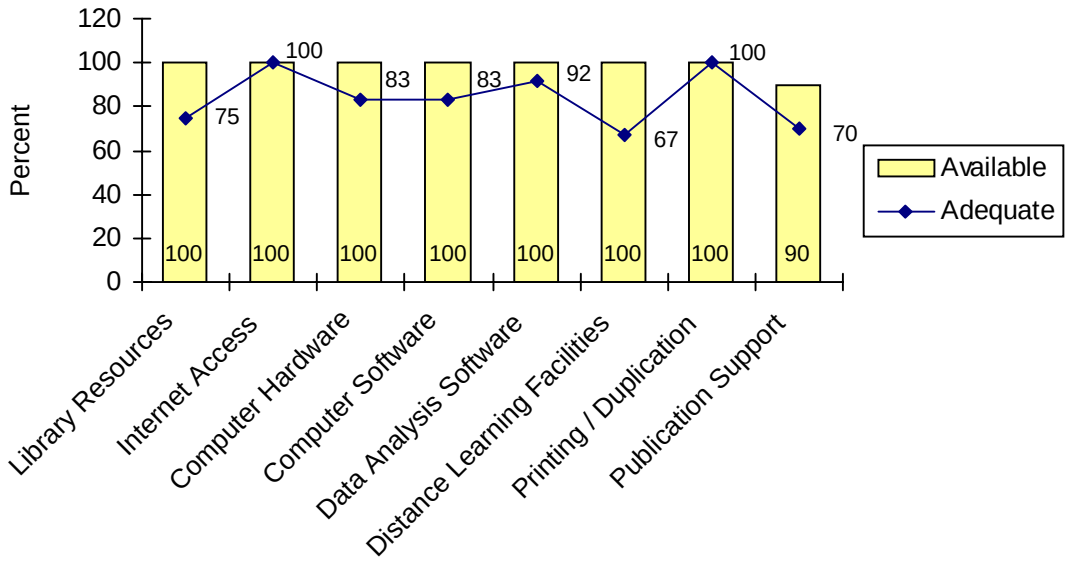

Figure 2. Availability and adequacy of research infrastructure.

Respondents were asked to rate the disciplinary skills related to teaching and learning in the context of the entire agricultural education profession. Mean scores for disciplinary skills are reported in Table 2. In the Needs Assessment category, four of the five skills earned mean ratings above 3.67. Survey instrument development earned the highest mean rating of 4.00. Respondents rated qualitative assessment notably lower (M = 2.92) than the other disciplinary skills in the category.

Within the category of Curriculum Development & Instructional Design (Table 2), respondents were asked to rate the profession's level of expertise regarding six disciplinary skills. Four of the six skills earned a mean score above 3.92, substantially higher than the two lowest rated disciplinary skills. Experiential learning (M = 4.17) and developing objectives (M = 4.00) produced the highest means, while motivation (M = 3.00) and assessing learning styles (M = 2.83) produced the lowest means.

Four of the six disciplinary skills in the Information Transfer & Delivery category clustered around a mean level of 2.90 (Table 2). Respondents rated pedagogy (M = 3.92) and adult education (M = 3.50) the highest.

Ten disciplinary skills were included in the Evaluation & Assessment category (Table 2). All skills earned mean ratings between 3.08 and 3.67, thus creating the most uniform scores among the four disciplinary categories.

Table 2
Mean Expertise Ratings of Disciplinary Skills Related to Teaching and Learning

Disciplinary Category / Disciplinary Skill	M[a]	SD
Needs Assessment		
Survey Instrument Development	4.00	0.60
Educational Program Planning	3.83	1.03
Population and Sampling Procedures	3.67	0.65
Advisory Committee Operation	3.67	1.16
Qualitative Assessment	2.92	0.79
Curriculum Development & Instructional Design		
Experiential Learning	4.17	0.84
Developing Objectives	4.00	1.13
Teaching Methods	3.92	1.17
Supervision of Learning	3.92	1.24
Motivation	3.00	1.04
Assessing Learning Styles	2.83	1.19
Information Transfer & Delivery		
Pedagogy	3.92	0.79
Adult Education	3.50	1.00
Instructional Design	3.00	1.13
Distance Learning	2.92	1.08
Educational Technology	2.83	1.12
Technology Adoption	2.75	1.42
Evaluation & Assessment		
Program Evaluation/Review	3.67	0.99
Program and Performance Standards	3.58	0.79
Validity and Reliability	3.42	0.79
Performance Indicators	3.42	1.17
Follow-Up Studies	3.42	1.00
Instrumentation	3.33	0.78
Performance Measures	3.27	1.10
Performance Reporting	3.17	0.84
Evaluation Models	3.17	1.12
Tests and Testing	3.08	1.00

[a] 1 = none, 2 = little, 3 = some, 4 = much, 5 = expert

Examination of the data revealed that the disciplinary skills received a wide range of scores from the respondents. Of the 27 skills assessed, 14 received ratings that ranged from 1 (no expertise) to 5 (expert). Further, each of the 27 disciplinary skills received an 'expert' rating from at least one respondent.

In order to further assess the disciplinary strengths of agricultural education, the five point Likert-type response scale was divided into thirds. This resulted in scale ranges of 1.00 to 2.33, 2.34 to 3.66, and 3.67 to 5.00 that were categorized low, medium and high, respectively. Disciplinary strengths were identified by selecting those skills that produced means in the high category (between 3.67 and 5.00). Table 3 reveals the disciplinary strengths of the agricultural education profession as perceived by the twelve NCA-24 committee members.

Table 3
Disciplinary Strengths of Agricultural Education

Disciplinary Category	Disciplinary Skill
Needs Assessment	Survey Instrument Development
	Educational Program Planning
	Population and Sampling Procedures
	Advisory Committee Operation
Curriculum Development & Instructional Design	Experiential Learning
	Developing Objectives
	Teaching Methods
	Supervision of Learning
Information Transfer & Delivery	Pedagogy
Evaluation & Assessment	Program Evaluation/Review

Results of the survey indicated that 10 skills were categorized as disciplinary strengths. There were 17 skills that produced means in the 'medium' category, and no skills produced means in the 'low' category (i.e., below 2.34).

Conclusions / Recommendations / Implications

The findings from this study provide a baseline indication of institutional and disciplinary research capacity in agricultural education. Identifying the human resources, research support and infrastructure, and disciplinary strengths may enable the agricultural education profession to determine its unique contribution to research. Based on the

responses of agricultural education program administrators at the 12 land grant institutions represented on the NCA-24 Committee, the following conclusions were drawn.

The combined efforts of faculty and graduate students are needed to conduct research. The current study indicates there is a wide range of FTE agricultural education faculty employed at institutions. This aligns with previous research by Persons & Kajer (1995), who reported the number of agricultural education faculty varied widely throughout the United States. Graduate students are an important human resource who contribute to research capacity in agricultural education. A sizable number of graduate students are pursuing advanced degrees in agricultural education, however there is a wide disparity among institutions in the number of full-time graduate students, and the number of assistantships available to support them.

Agricultural education programs have access to a wide range of research support staff and infrastructure resources. It appears that these resources are meeting the needs of a significant number of respondents. However, several areas appear to be inadequate, which may limit the productivity of agricultural education researchers.

The agricultural education profession can be characterized as possessing expertise with a number of disciplinary skills. A majority of the disciplinary strengths are identified in the categories of Needs Assessment, and in Curriculum Development & Instructional Design. To a lesser extent, disciplinary strengths can be identified in the disciplinary categories of Information Transfer & Delivery, and Evaluation & Assessment.

Although the findings of this study can only be applied to the agricultural education programs that provided responses, the potential implications may be of interest to the broader profession. Agricultural education faculty and administrators located at land grant colleges in other states and regions may be particularly interested in these findings. Therefore, the following recommendations are offered to improve the research capacity of agricultural education.

The number of agricultural education faculty should be increased to allow for more research activities. This is especially true at institutions that have a small number of faculty, and where teaching and other duties are likely to dominate faculty members' time. More faculty are needed to conduct research, and mentor graduate students in this scholarly process. Tenured faculty should be encouraged to continue to conduct and publish research studies. This segment of the profession can provide leadership by sharing their research focus and expertise. Opportunities to provide graduate assistantships at all institutions should be identified. Increasing support for more graduate students to assist with research studies should enhance research capacity within each institution. Graduate programs should also be designed so that collaborative research projects and activities are provided to prepare doctoral students for their future involvement as faculty members.

Agricultural education departmental administrators should seek to increase support staff specifically to assist with manuscript preparation. There is a need to improve the 'adequacy' of support staff for manuscript preparation, grant proposal development, and research data entry. Distance learning facilities should also be

improved in order to better meet the research infrastructure needs of agricultural education programs.

The findings of this study indicated that the Agricultural Education discipline possessed expertise in several disciplinary skill categories. The unique strengths of the profession were identified in order to specify potential contributions to collaborative research initiatives. Promoting disciplinary strengths with Experiment Station Directors and Land Grant College Administrators may prompt them to consider agricultural educators as potential collaborative research participants.

The profession enjoys the reputation for effective teaching and advising at many universities. This desirable characteristic may at times overshadow the potential contributions the discipline offers in collectively solving research problems. Communicating the disciplinary strengths to colleagues in other departments may serve to enhance the research capacity of the profession. Faculty should prepare graduate students to develop research expertise in the disciplinary skills the profession has identified as its strengths. The researchers suggest that further study is needed to assess the research capacity of other regions of the United States, and the entire profession.

The implications of this study are important for agricultural education faculty, land grant college faculty, and administrators across the United States. Recognizing the continuing need for research focused on disciplinary problems, agricultural educators should engage in more collaborative research. Future research will consist of " . . . multistate, multi-institutional, and multidisciplinary collaborations and partnerships (i.e., a 'new geography' for the land grant system)" (Committee on the Future of the Colleges of Agriculture in the Land Grant University System, 1996, p. 21). Now is the time for the agricultural education discipline to consider its role in becoming a full partner in this new research mission.

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Assessing Research Capacity in Agricultural Education:
A Summary of Twelve Land Grant Program Administrators

A Critique

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Contribution and Significance of Research

The perspectives of twelve land grant program administrators are useful in developing a strategic plan for research in agricultural education. However, there was substantial disparity in each of the primary measures among the programs. There is substantial human capacity within the twelve programs. When articulated, 96 faculty and 279 full-time graduate students represent potential. What strategies would articulate high priority educational research problems within the context of biotechnology, sustainable communities, and food safety? How can networks be developed that would collectively address important problems?

Questions for Consideration

With three exceptions among the 12 programs, there was a somewhat adequate and available research support staff. What strategies are useful to increase adequate grant development, research data entry, and manuscript preparation? Also, with three exceptions, there was a somewhat adequate and available research infrastructure in place. What strategies are useful to increase distance-learning faculties, publication support, and library resources? The authors provide a valuable description of disciplinary categories and skills. However, the perspective is one of content. Gray noted that learning has shifted from knowledge as matter to knowledge as practice. "So, whereas the conventional wisdom of the old economy was that ‘content is king,' in the new economy, context is king" (Gray, 2000). So the question arises: What are the contextual settings that are appropriate for our disciplinary skills?

The authors recommend increased communication to Experiment Station Directors and LGC Administrators about the research skills currently held and the potential for collaboration. Further, they encourage us to describe our strengths in four categories: "needs assessment, curriculum development and instructional design, information transfer and delivery, and evaluation and assessment." How can we also communicate our contribution in the inquiry of important stakeholder research?

Benchmarks for success in research and scholarship include: (1) stakeholders who advocate investments in social science research pertaining to agricultural education and communicate the value of the research to policy makers, (2) faculty who focus on relevant problems within their knowledge base and dedicate appropriate time to inquiry, (3) faculty who encourage graduate students to join in their personal research agenda and contribute to greater solutions, (4) congruence [exists] between research conducted by the faculty and graduate students and in the contextual applications in which they work, and (5) faculty working collaboratively within an interdisciplinary team to address pedagogical issues related to teaching and learning research associated with production

efficiency, economic viability, emerging trends, environmental compatibility, and social responsibility" (Strategic Framework, 2000).

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